4-7-2021

Swine Disease Reporting System Report #38

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Swine Disease Reporting System
Report # 38 (April 6, 2021)

What is the Swine Disease Reporting System (SDRS)? SDRS includes multiple projects that aggregate data from participating veterinary diagnostic laboratories (VDLs) in the United States of America (USA), and reports the major findings to the swine industry. Our goal is to share information on endemic and emerging diseases affecting the swine population in the USA, assisting veterinarians and producers in making informed decisions on disease prevention, detection, and management.

After aggregating information from participating VDLs and summarizing the data, we ask the input of our advisory group, which consists of veterinarians and producers across the USA swine industry. The intent is to provide an interpretation of the observed data, and summarize the implications to the industry. Major findings are also discussed in monthly podcasts. All SDRS reports and podcasts are available at www.fieldepi.org/SDRS. The SDRS projects are:

Swine Health Information Center (SHIC)-funded Domestic Swine Disease Surveillance Program: collaborative project among multiple VDLs, with the goal to aggregate swine diagnostic data and report in an intuitive format (web dashboards and monthly PDF report), describing dynamics of pathogen detection by PCR-based assays over time, specimen, age group, and geographical area. Data is from the Iowa State University VDL, South Dakota State University ADRDL, University of Minnesota VDL, and Kansas State University VDL.

Collaborators:

Iowa State University: Giovani Trevisan, Edison Magalhães, Bret Crim, Poonam Dubey, Kent Schwartz, Eric Burrough, Phillip Gauger, Pablo Pineyro, Christopher Siepker; Rodger Main, Daniel Linhares.

Project coordinator Giovani Trevisan. Principal investigator Daniel Linhares.

University of Minnesota: Mary Thurn, Paulo Lages, Cesar Corzo, Jerry Torrison.

Kansas State University: Rob McGaughey, Eric Herrman, Roman Pogranichniy, Rachel Palinski, Jamie Henningson.

South Dakota State University: Jon Greseth, Darren Kersey, Travis Clement, Jane Christopher-Hennings.

Disease Diagnosis System: A pilot program with the ISU-VDL consisting of reporting disease detection (not just pathogen detection by PCR), based on diagnostic codes assigned by veterinary diagnosticians.

FLUture: Aggregates influenza A virus (IAV) diagnostic data from the ISU-VDL and reports results, metadata, and sequences.

PRRS virus RFLP report: Benchmarks patterns of PRRSV RFLP pattern detected at the ISU-VDL over time, USA state, specimen, and age group.

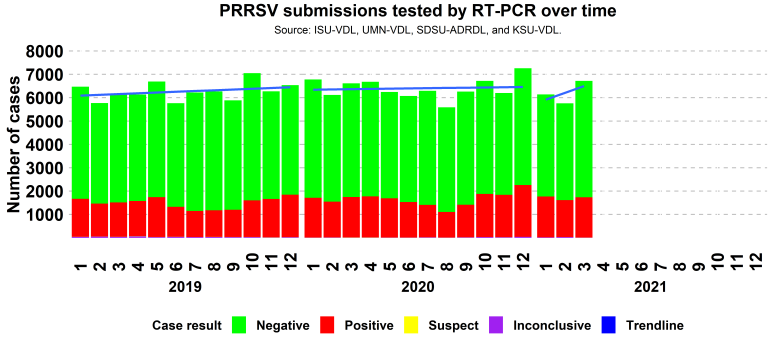
Audio and video reports: Key findings from SDRS projects are summarized monthly in a conversation between investigators, and available in the form of an 'audio report', and "video report" through SwineCast, YouTube, LinkedIn, and the SDRS webpage.

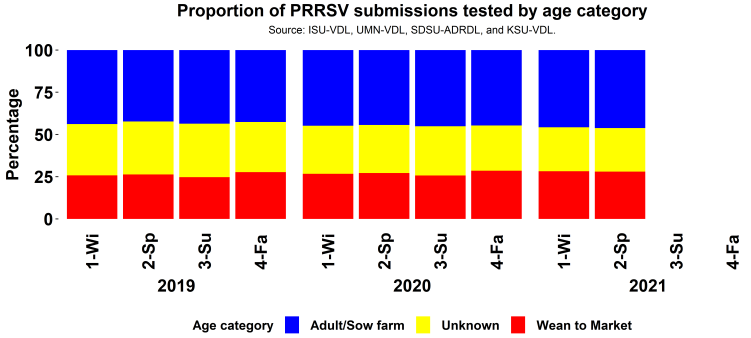
Advisory Group: Reviews and discusses the data, providing their comments and perspectives on a monthly: Mark Schwartz, Paul Yeske, Rebecca Robbins, Tara Donovan, Deborah Murray, Scott Dee, Melissa Hensch, Brigitte Mason, Peter Schneider, and Sam Copeland.

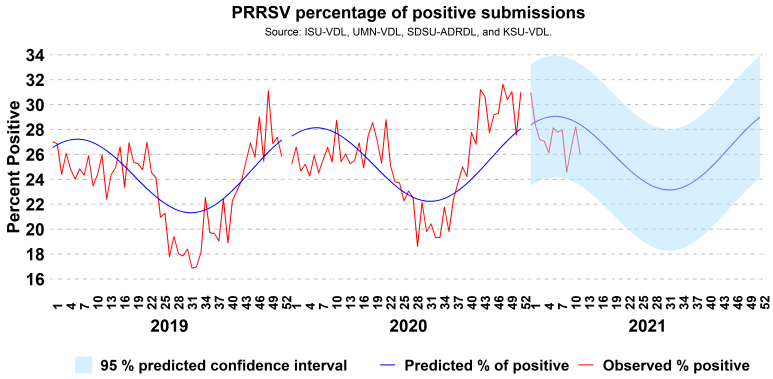
In addition to this report, interactive dashboards with aggregated test results are available at www.fieldepi.org/SDRS.

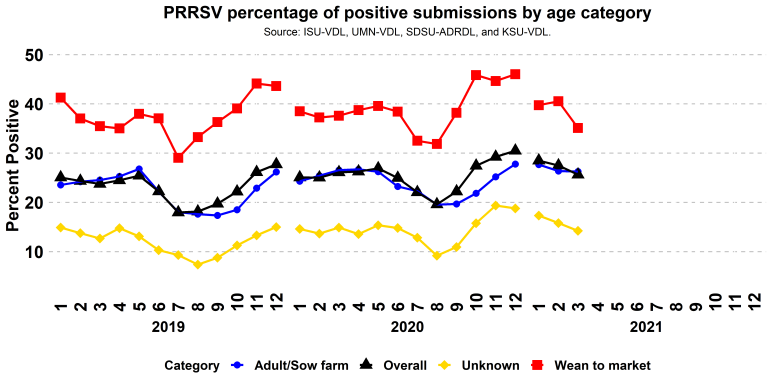
Note: This report contains data up to March 31, 2021.

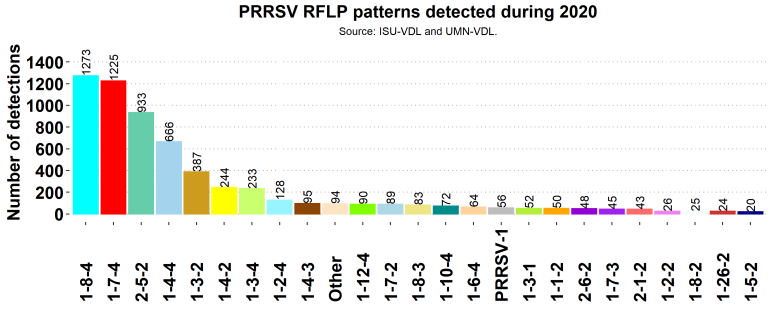
Topic 1 – Detection of PRRSV RNA over time by RT-qPCR.











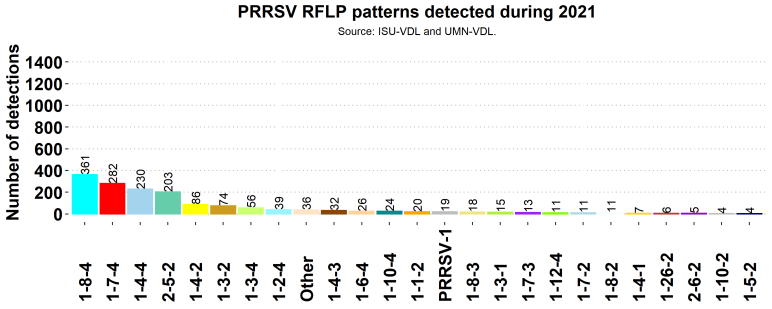
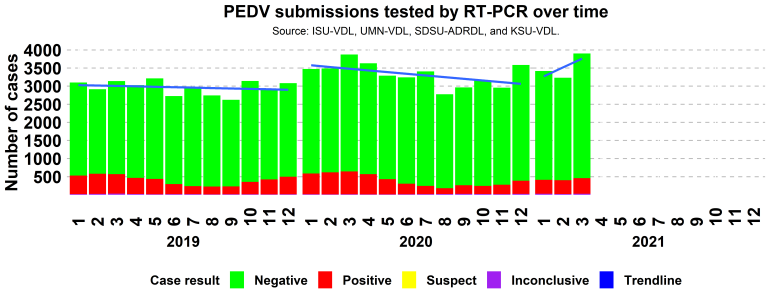


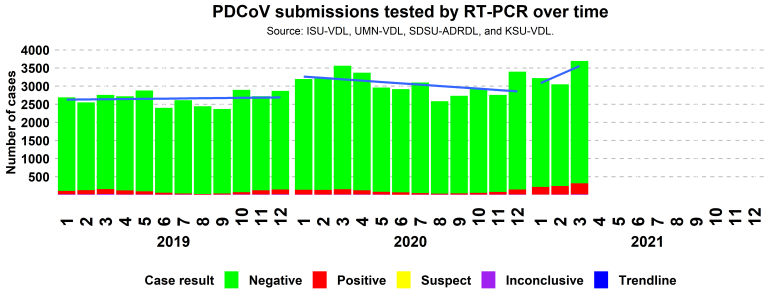
Figure 1. Top: *left*: Results of PRRSV RT-PCR cases over time. *Right*: Proportion of accession ID cases tested for PRRSV by age group per year and season. **Middle**: *Left* expected percentage of positive results for PRRSV RNA by RT-qPCR, with 95% confidence interval band for predicted results based on weekly data observed in the previous 3 years. *Right*: percentage of PRRSV PCR-positive results, by age category over time. Wean to market corresponds to nursery and grow-finish. Adult/Sow correspond to Adult, boar stud, breeding herd, replacement, and suckling piglets. Unknown corresponds to not informed site type or farm category. **Bottom** the 25 most frequently detected RFLP patterns *left* year of 2020; *right* year of 2021.

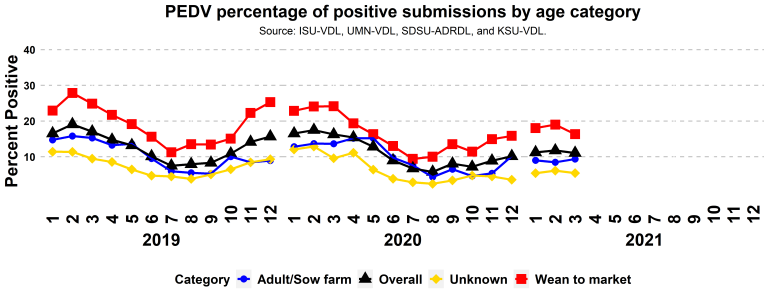
SDRS Advisory Group highlights:

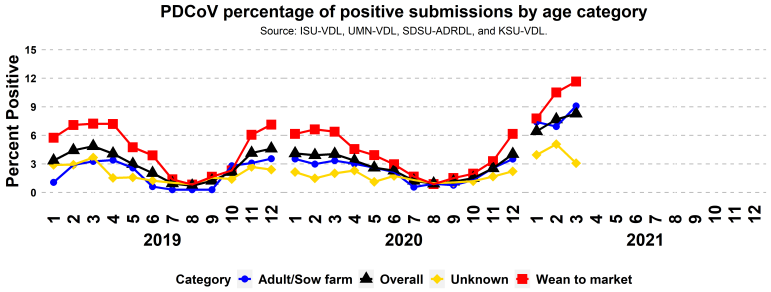
- Overall, 25.63% of 6,722 cases tested PRRSV-positive in March, similar to 27.49% of 5,759 in February;
  - The overall PRRSV detection was within the forecasted levels during March;
  - Positivity in adult/sow category in March was 26.26% (815 of 3,104), similar to 26.38% (696 of 2,638) in February;
  - Positivity in wean-to-market category in March was 35.1% (661 of 1,883), a substantial decrease from 40.54% (645 of 1,591) in February;
  - Overall PRRSV-percentage of positive cases was 3 standard deviations from state-specific baselines NE and OH;
- The advisory group pointed out that decreasing detection of PRRSV is partly a reflection of lower PRRSV prevalence in the field due to herd closures adopted in the Fall of 2020;
- Additionally, the increased detection of PRRSV in NE and OH is associated with a higher number of PRRSV breaks in those regions this winter;
- Based on PRRSV detection,ORF-5 sequences, and disease diagnosis reports, and also based on input from the advisory group, the PRRSV 1-4-4 Lineage 1C variant situation is not further spreading or becoming an epidemic. We will continue to monitor the situation closely.

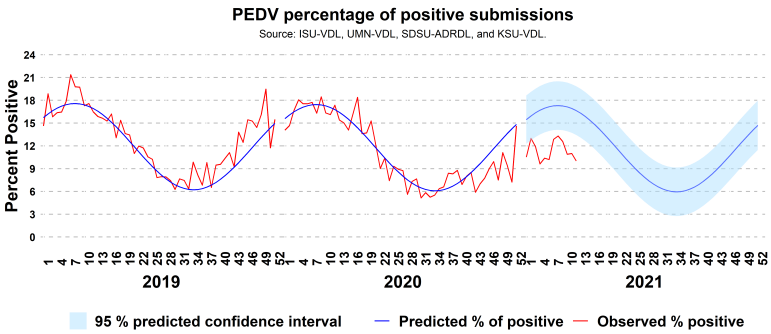
Topic 2 – Detection of RNA of enteric coronavirus by RT-qPCR

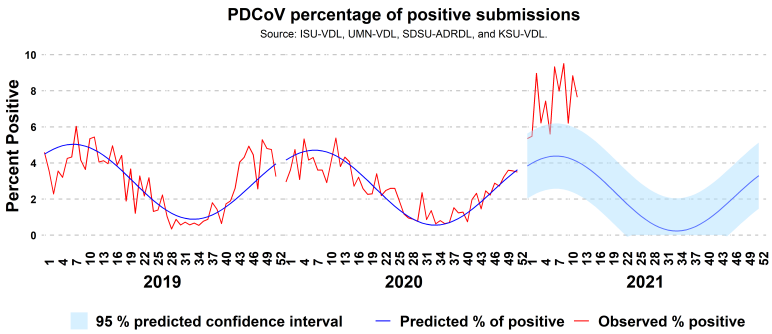












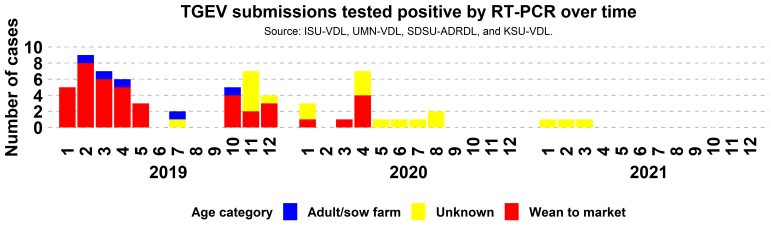


Figure 2. Top: *left* PEDV; *right* PDCoV cases tested by RT-PCR over time. **Second from top:** *left* PEDV; *right* PDCoV percentage of PCR-positive results, by age category over time. **Third from top:** *left* PEDV; *right* PDCoV expected percentage of positive results for cases tested by RT-qPCR and 95% confidence interval for 2021 predicted value. **Bottom:** number of TGEV positive cases by age category.

SDRS Advisory Group highlights:

- Overall, 11.04% of 3,903 cases tested PEDV-positive in March, similar to 11.76% of 3,231 in February;
  - Positivity in adult/sow category in March was 9.35% (107 of 1,144), similar to 8.46% (83 of 981) in February;
  - Positivity in wean-to-market category in March was 16.33% (261 of 1,598), a moderate decrease from 19.01% (235 of 1,236) in February;
  - Even though the overall PEDV-percentage of positive cases was within 3 standard deviations from state-specific baselines in all 11 monitored states, the PEDV-percentage of positive cases was 3 standard deviations from state-specific baselines for the adult/sow and wean-to-market category in IL;
- Overall, 8.28% of 3,694 cases tested PDCoV-positive in March, similar to 7.67% of 3,050 in February;
  - The overall PDCoV detection was outside of the upper boundaries of the forecasted levels since January;
  - Positivity in adult/sow category in March was 9.1% (97 of 1,066), a moderate increase from 6.93% (64 of 923) in February;
  - Positivity in wean-to-market category in March was 11.65% (174 of 1,493), similar to 10.51% (120 of 1,142) in February;
  - Overall PDCoV-percentage of positive cases was 3 standard deviations from state-specific baselines in OK, KS, MO, and NC;;
  - March 2021 recorded the historically highest total number of cases tested for PDCoV in the US. Additionally, PDCoV detection was the highest since the PDCoV-epidemic year of 2014;
- There was 1 positive case for TGEV RNA in March, 2021 over a total of 3,596 cases tested;
- The advisory group pointed out that the increased detection of PDCoV has been associated with farm connections. New breaks in sow farms have been observed in different regions. Even though there is more activity of PDCoV in the field, the advisory group reminded us that sow farms elimination programs had been successfully in eliminating PDCoV.

Topic 3 – Detection of *Mycoplasma hyopneumoniae* (MHP) DNA by PCR.

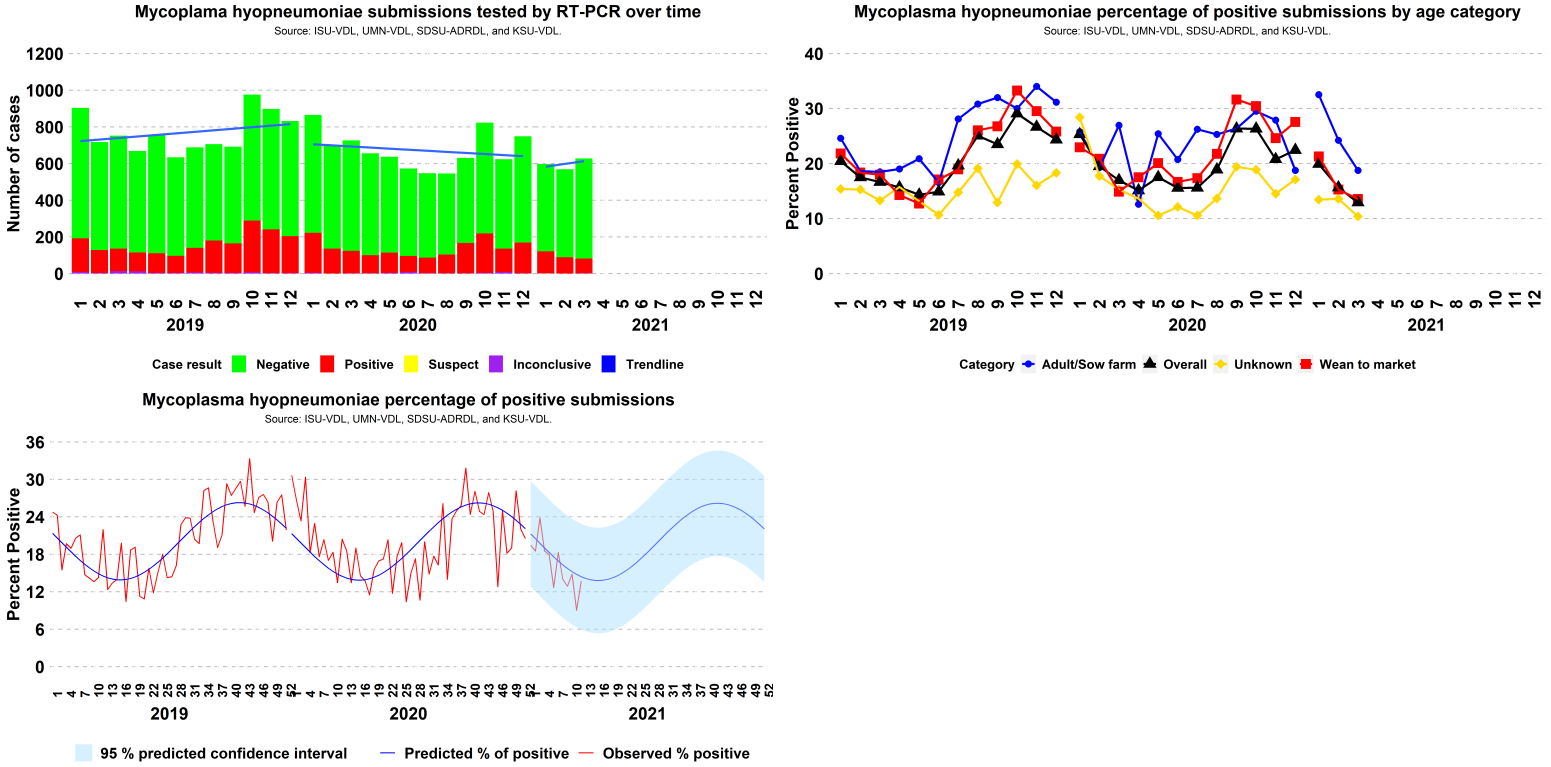


Figure 3. *Left top*: results of MHP PCR cases over time. *Right top*: percentage of MHP PCR-positive results, by category over time. *Bottom*: expected percentage of positive results for MHP by PCR and 95% confidence interval for 2020 predicted value, based on weekly data observed in the previous 3 years.

SDRS Advisory Group highlights:

- Overall, 12.92% of 627 cases tested *M. hyopneumoniae*-positive cases in March, a moderate decrease from 15.64% of 569 in February;
  - Positivity in adult/sow category in March was 18.75% (12 of 64), a substantial decrease from 24.24% (16 of 66) in February;
  - Positivity in wean-to-market category in March was 13.55% (45 of 332), similar to 15.27% (42 of 275) in February;
  - Overall MHP-percentage of positive cases was 3 standard deviations from state-specific baselines in MO;
- As expected the observed overall detection of *M. hyopneumoniae*-positive cases is following the forecasted expected decrease in the levels of detection for this time of the year.
- The lowest positivity of *M. hyopneumoniae* PCRs is expected during month of March to May.

Topic 4 – Disease diagnosis at the ISU-VDL.

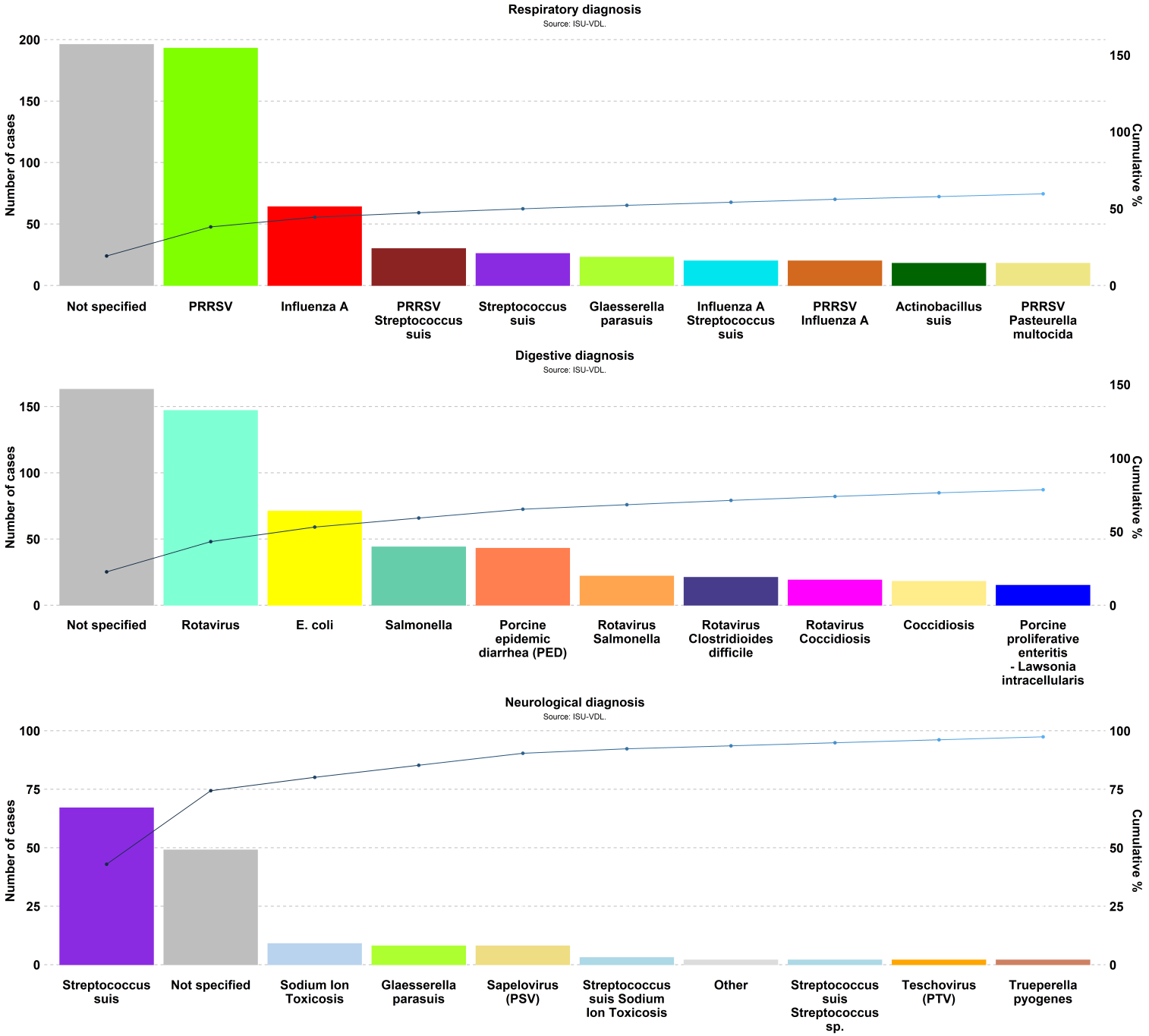


Figure 4. Most frequent disease diagnosis by physiologic system at ISU-VDL . Presented system is described in the title of the chart. Colors represent one agent and/or the combination of 2 or more agents. Only the physiologic systems with historic number of cases per season above 100 are presented in the report.

Note: Disease diagnosis takes one to two weeks to be performed. The graphs and analysis contain data from February 1, 2021 to March 20,2021.

SDRS Advisory Group highlights:

- After not specified (196 of 1019), PRRSV (194 of 1019) continues to lead the number of respiratory diagnoses. After not specified (163 of 717), Rotavirus 148 of 717) continues to lead the number of digestive diagnoses. *Streptococcus suis* (67 of 156) continues to lead the number of neurological diagnosis;
- During February 15 to 21, there was a significant increase (signal) in the diagnosis of agents classified as nervous, from 22 to 27 for integument and cardiovascular-blood-endocrine-immune diagnosis, and from March 7 to 13 for digestive diagnosis.
- During February 1 to 13 2021, there was a significant increase (signal) in the diagnosis of Salmonellas.
- Even though there is a restricted number of cases for *Streptococcus sp.* and Mulberry Heart Disease, there was a significant increase (signal) in these agents' diagnosis during February.

Educational interactive disease diagnosis dashboards are now available!
Sign up required - it is a free tool!

The disease diagnosis dashboards avaliable throught the SDRS project summarizes disease detection trends from cases submitted to the Iowa State University Veterinary Diagnostic Laboratory (ISU-VDL). The other SDRS participant VDLs may join in the future. PCR-based tests inform pathogen detection, which may or may not be causing disease. To report disease detection (i.e., pathogen(s) causing clinical problems), veterinary diagnosticians gather multiple layers of information, including data available in submission forms, test results including PCR, bacterial culture, virus isolation, parasitic flotation, macroscopic and microscopic findings. When a conclusion is reached at the ISU-VDL, diagnosticians assign one or more standardized diagnostic codes (DX code) for cases, documenting etiology, insult type, associated lesions, and the insultant(s). The SDRS dashboards for disease detection at the ISU-VDL were redesigned to present the information and summarize disease detection on swine cases over time based on DX codes. Results are based on diagnostician interpretation of testing selected and solely informs disease detection for different systems.
Dashboards can be accessed at https://www.fieldepi.org/diagnosis/. There is a need to fill out a registration form. **It is free!** Once you register, a link is sent to your email to finalize the registration. Use the link sent by email to confirm your registration and you are all set. You can log in and access the educational interactive dashboards by using your created username and password. Disease diagnosis dashboards are filled with information as early as 2010 with data of more than 100,000 cases (Fig. 1).

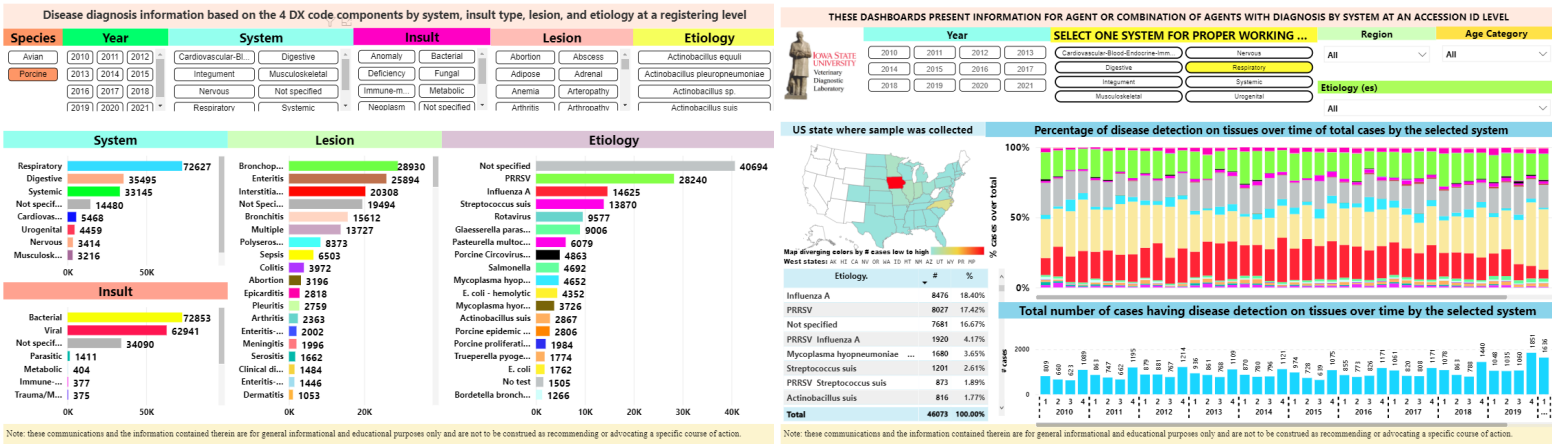


Figure 1: **Left**: Porcine and avian disease diagnoses information based on DX code components by system, intult type, lesion, and etiology assigned at ISU-VDL since 2010. *Upper part* of the figure has dynamic filters those can be used to filter the data accordingly **Right**: Porcine respiratory disease diagnosis over time. *Top filters* can be used in the dashboard to slice the data. *Left middle*, map: geographic state in which samples were collected. *Right middle*: bar chart with proportion of diagnoses by etiology. Most frequently detected etiologies. *Bottom right*: bar chart with total respiratory cases per year and quarter. *Bottom left*: table for etiology, number of cases, and proportion of total respiratory cases.

Highlights:

- Disease diagnosis educational dashboards are now avaliable;
- Interactive dashboards allow to filter the infomration by system, intult type, lesion, etiology, age category, and geographical region;
- Disease diagnosis data since 2010. Above 100k cases;
- Sign up required.

Reference:

Trevisan, G. *et al.* (2021) *Visualization and application of disease diagnosis codes for population health management using porcine diseases as a model*, J Vet Diagn Invest. https://doi.org/10.1177/1040638721995782.

Note: *Contact the SDRS project if you would like to share your work on the bonus page.*